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ABSTRACT

The paper defines and assesses a concept acquisition model for describing the behavior processes through which conceptual-observational instruction influences teaching behavior. This model is contrasted with two other views of the relationship between this mode of instruction and performance: an imitative behavior model and a behavior labeling model. Results of empirical studies are cited, and data are presented that support and provide evidence on assumptions central to the concept acquisition model. Hypotheses suggested by the model are applied to teacher education, and research problems are identified that would provide further tests of the model. (Author)

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THE CONCEPT ACQUISITION MODEL IN THE DEVELOPMENT OF TEACHING SKILLS

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THE CONCEPT ACQUISITION MODEL IN THE DEVELOPMENT OF TEACHING SKILLS

A conceptual-observational component is a major element in many teacher training materials and systematic studies of teacher training. In such a component, the teaching skill or skills to be acquired are portrayed or exemplified through the medium of audiotape, videotape, or film. Skills are identified by name and may be defined or described verbally as well. The essential characteristic of such a component, however, is exemplification of the skills to be acquired.

Typically, such a conceptual-observational component precedes a practice component, its purpose to illustrate or "model" the skills to be practiced. This sequence is characteristic of the minicourse and of much systematic microteaching training. A conceptual-observational component has also been used, however, as a direct means of bringing about change in teaching skills as through the use of some protocol and training films. While the empirical evidence to be reviewed in the next section of this paper demonstrates both the indirect and direct influence of conceptual-observational training on teaching skill, the specific outcomes of training that might mediate skill acquisition have not been delineated. Identifying and verifying these outcomes is a first step in developing a more effective training model from which hypotheses can be derived for definitive studies in the training of teachers and other educational specialists.

The purposes of this paper are (a) to analyze conceptual-observational training in terms of its most important skill-related outcomes and (b) to propose a training model based upon this analysis that can be subjected to further verification. The ultimate goal of the line of research initiated is the development of a training model that maximizes the effect of conceptual-observational training on the performance of professional skills in education.

The analysis in this paper will draw upon past research on conceptual-observational training conducted by the authors and other investigators as well as upon newly gathered evidence, an important part of which is based on the perceptions of teacher trainees themselves. The evidence presented in this paper should be viewed, however, as exploratory and hypothesis stimulating rather than definitive or decision-oriented.

Evidence on the Effectiveness of Conceptual-Observational Training

We have referred to evidence that conceptual-observational training influences the acquisition of teaching skills. As stated above, this evidence is of two kinds: evidence on the influence of conceptual-observational training associated with practice (an indirect effect) and evidence on the influence of conceptual-observational training in the absence of practice (a direct effect). A brief review of this evidence should provide an empirical foundation for the analysis that follows.

Conceptual-observational training as an addition to practice. The effectiveness of microteaching incorporating a conceptual-observational component has been amply documented (Turney, Clift, Dunkin & Traill, 1973); there seems little question that such training generally results in gains in teaching skills at least on an immediate basis. The relative influence on skill acquisition of the conceptual-observational component itself has been less well documented. The results of studies by Koran, Snow and McDonald (1971) and MacLeod and McIntyre (1977), however, suggest that this component does influence the effectiveness of practice. Koran and her co-authors report that learning to discriminate instances of an analytic questioning skill from printed or videotaped "models" was a necessary adjunct to practice in acquiring that skill. MacLeod and McIntyre report that learning to discriminate examples of a higher order questioning skill prior to microteaching resulted in significant differences (in comparison to a non-microteaching group) on two of three skill performance criteria. The same differences were apparently not demonstrated for a microteaching group that viewed models of the skill without cognitive-discrimination training. Thus, the evidence that does exist indicates that conceptual-observational training adds to the effectiveness of practice especially when it includes a cognitive-discrimination component.

Conceptual-observational training as an alternative to practice. There is clear evidence also that conceptual-observational training alone is an effective means of establishing teaching skills. Studies

utilizing such a training component, in the absence of overt practice, have demonstrated significant changes in cognitive teaching skills (Gliessman, Pugh & Bielat, 1979; Santiesteban & Koran, 1977) and in affective teaching skills (Lange, 1971; Wagner, 1973). The evidence of a direct influence of conceptual-observational training on teaching performance is sufficiently strong that the present authors (1979) have proposed a concept-based model as an alternative to practice-based training for the acquisition of teaching skills.

While the studies cited substantiate the indirect and direct influence of conceptual-observational training on skill acquisition, several also report evidence relating to the specific outcomes of training that may mediate skill acquisition. On the basis of that evidence, other data from our own past research, and psychological theory, it is possible to formulate some hypotheses about the skill related outcomes of training that are delineated in the next section.

Outcomes of Conceptual-Observational Training

From a psychological point of view, it is reasonable to assume that "understanding" a skill as a concept can provide a cognitive referent that facilitates use of the skill itself in an appropriate setting and given an appropriate motivational set. It might be expected that the greater the clarity and discriminability of a skill concept for the teacher, the greater would be its availability to influence that teacher's behavior under appropriate conditions

(Ausubel & Robinson, 1969).[1] If this assumption is valid, then any conceptual outcomes of training (i.e., acquisition of skill concepts) become especially important. In the studies by Gliessman, Pugh and Bielat (1979), Santiesteban and Koran (1977), and Wagner (1973), evidence showed that trainees who received conceptual-observational training were significantly more accurate in identifying or categorizing instances of the criterial skill than were subjects in control or nontraining groups. In only the last two studies was reliability established for the measurement instrument used; however, the results are sufficiently consistent to suggest that increased skill frequencies were accompanied by increased or significantly greater understanding of the concepts referring to those skills.

Evidence more directly substantiating a relationship between concept acquisition and skill acquisition is provided in the study by Gliessman, Pugh and Bielat. The concept acquisition scores of those teachers receiving concept-based training were correlated with the frequencies with which the skills themselves were exhibited. A positive and significant relationship ($r = .51$, $p = .08$) was found between skill concept scores and skill frequencies. Thus, mastery of skill concepts tended to be associated with frequency of using the skills themselves.

It is plausible, both evidentially and theoretically, to

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[1]The term "skill concept" will occasionally be used for efficient communication; it is a shorter term for "concept referring to a teaching skill."

hypothesize that observational effects of training are also reflected in skill acquisition. In his study, Lange (1971) found that viewing a twenty-minute film portraying an indirect teaching style significantly increased the use of that teaching style by a group of preservice teachers. He interpreted this finding in terms of social imitation theory (Bandura & Walters, 1963). This interpretation would suggest that direct imitative processes were involved in acquiring the skills associated with the use of indirect influence. It does not seem unlikely that such observational effects were present in the studies cited in the previous section as well. In these studies, training was based upon exemplification of skills through audio or audiovisual media so that the basis for such effects was clearly present.

Finally, it is probable that what might be called nominal outcomes are reflected in the influence of conceptual-observational training on skill acquisition. In its most extreme form, this view would posit that the skills to be acquired through training generally are familiar, well-established behaviors. The effect of training is to attach a formal name to those behaviors that in a sense legitimatizes them as teaching skills. The plausibility of this view is supported by considering the skills typically addressed in teacher training materials and studies. Questioning skills and such affective skills as the use of praise are common objectives of training; on the face of it, such skills would seem to be highly familiar cognitive and affective behaviors that are not at all unique to, or unusual in,

teaching itself.

On both psychological and evidential grounds, then, it seems probable that conceptual, observational, and nominal outcomes are all reflected in the results of conceptual-observational training; if this is the case, any or all of these outcomes may help to mediate the acquisition of skills. The purpose of the exploratory study reported in the next section of this paper was to clarify further the nature of these outcomes and their possible role in skill acquisition.

Further Evidence on the Outcomes of Training

In this exploratory study, two types of evidence were planned:

a. evidence on the relationship between skill concept acquisition scores and skill frequencies in a trained group. While the effect of conceptual-observational training on concept acquisition has been amply demonstrated, it was judged desirable to confirm the previously established relationship between concept scores and the frequency with which the referent skills are exhibited (Gliessman, Pugh & Bielat, 1979). Such correlational data provide more direct evidence on the possible mediating influence of concepts in skill acquisition.

b. evidence on the outcomes of training reflected in the written responses of trainees. These responses were

obtained when the trainees were asked to analyze recordings of their own teaching in terms of the skills addressed in training.

Although not originally planned, a third type of evidence was ultimately gathered:

c. evidence in the trainees' written responses of their ability to use skill concepts interpretively in the process of analyzing their own teaching. The purpose of this evidence was to extend the criterion for assessing conceptual outcomes from the level of concept acquisition to more complex levels of comprehension.

Subjects and setting. The subjects were thirty practicing teachers enrolled in a master's level course in the psychology of teaching. Training was provided as part of the normal course requirements; teaching was done in a microteaching laboratory utilizing college undergraduates as students. The training group was heterogeneous in grade level and specialty area of teaching; it included both elementary and secondary level teachers. All had at least one year of teaching experience.

Materials and methods of training. The materials for training were the protocol films in the Concepts and Patterns in Teacher-Pupil Interaction series; these are the films used in all previous investigations by the authors.[2] The concepts exemplified in the

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[2]This film series, developed and produced under USOE funding, is distributed by the Audio-Visual Center, Indiana University, Bloomington, IN 47405.

Concepts and Patterns series refer to three pairs of interactive skills: reproductive and productive questioning as soliciting behaviors, probing and informing as reactive behaviors, approving and disapproving as influencing behaviors.

The series consists of three Concept films (in which the above pairs of skills are defined and systematically exemplified) and six Pattern films (in which ongoing teaching behavior is portrayed that can be analyzed in terms of the skill concepts). Using the two types of films in sequence, the trainees were exposed to a structured concept learning experience followed by a less structured experience in interpreting teaching behavior in terms of those concepts. The training itself, which consumed approximately six hours of class room time over two consecutive days, was film-based supplemented by discussion to clarify the skill definitions and characteristics. At no point during training was practice provided in the skills themselves.

Evaluation instruments, techniques, and criteria. Concept acquisition was measured through the use of the Categorizing Teacher Behavior test. This 35-minute "test on film" consists of thirty brief classroom vignettes portraying teacher behavior in a classroom setting. The general task for the trainee is to determine if the behavior portrayed in the vignettes contains instances of the skills specified in the series. The highest possible concept acquisition score for the skill of probing is 20 points representing 20 correct decisions ("yes" or "no") on the presence of that skill. Validation data on the test and its subtests, established by demonstrating predicted

changes in mean scores and standard deviations, are provided in the test manual (Pugh, Goodwin & Gliessman, 1976).

Skill acquisition was measured by means of a ten to fifteen minute, audiotaped microteaching session using college undergraduates as students. Each trainee taught a self-selected topic (e.g., mainstreaming, desert environment, alcoholism) to a group of from three to six students. The microteaching session took place approximately one week following training and was presented as part of a unit on "concept teaching." To establish a general "set" to use the interactive skills emphasized in training, the following general direction was given to the trainees immediately prior to teaching:

> Because this session should involve interactive teaching, it would be a good place to use some of the interactive skills that we studied last week.

Of the six skill concepts treated in the Concepts and Patterns series, probing was selected as the criterion skill for assessing the relationship between concept acquisition and skill acquisition and for evaluating the trainees' written responses. As a criterion skill, probing has the advantages of being (a) complex in its characteristics (as compared to approving or disapproving which are demonstrably simpler skills), (b) well suited to the logistics of microteaching (as compared to reproductive questioning which requires advanced study by students in the microteaching session or productive questioning which is likely to occur frequently and naturally in interactive teaching), and (c) more amenable to objective coding than

is the skill of informing. In short, it was felt that any relationships or significant outcomes that were found could be best established for the skill of probing.

The audiotaped microteaching sessions were transferred to typed transcripts that were independently coded for the skill of probing by two trained raters overlapping on a randomly selected one-third of the total transcripts. The proportion of judgments on individual teacher entries on which the two coders agreed was .89. Since chance agreement would be substantially greater than zero, a "corrected for chance" index of agreement was determined and found to be .50. While not a substantial degree of reliability, this level of agreement was judged to be sufficiently high to yield dependable information in an exploratory study.

Each trainee was provided an audiotaped copy of his or her teaching session and asked to analyze it in terms of the following questions:

> Did you consciously attempt to use any interactive skills?
> Which ones?
> Why did it occur to you to use these?

The trainees wrote from one paragraph to several pages in response to these questions. The content of their responses was analyzed for evidence of conceptual, observational, and nominal influences in their use of the interactive skills, particularly the skill of probing. Their responses were also evaluated for evidence of the ability to use the concept of probing interpretively, specifically on the criteria of accuracy and application.

The responses were evaluated independently by two of the authors, differences being later resolved through joint analysis. Percentages of agreement for identifying and evaluating the above content dimensions ranged from .80 to .97 (.58 to .90 corrected for chance).

Results

The relationship between skill concept acquisition scores and skill frequencies was assessed by (1) splitting the sample (N = 30) into two groups based on the median skill frequency and (2) testing the difference between mean skill concept acquisition scores for the two groups. No significant difference ($p > .10$) was found between the means for the two groups (17.31 and 17.94). The relationship found previously between skill frequencies and skill concept acquisition scores was not replicated.

Analysis of the trainees' written responses yielded subjective evidence of both conceptual and nominal outcomes of training (in decreasing order of frequency) but no evidence of observational effects. Fifty percent of the responses contained evidence of at least a moderate degree of awareness of the skill concepts, including probing, during the teaching sessions. Twenty percent of the trainees said specifically that several of the skills, including probing, were familiar to them in their own teaching. There was, however, no reference made to the extensive examples shown in the films nor to the imitation of those examples in any of the written responses.

with reference to the interpretive use of the concept of probing, one-third of the trainees' responses were judged to reflect an accurate understanding of the concept (as indicated by giving at least one defining characteristic). Twenty-seven percent evidenced an ability to apply the concept by citing examples directly from or based upon an analysis of their teaching sessions; of these, two-thirds were judged to be high in accurate detail.

To provide more direct evidence on the relationship between these conceptual dimensions and the use of probing in teaching, contrasting groups were formed on each dimension: high and low accuracy, and high and low application. Differences were tested between median skill frequencies for the high and low groups on each dimension. A significant ($p = .06$) difference between median skill frequencies was found for the contrasted groups on the application dimension. For the high application group, 83 percent were above the common median whereas only 38 percent of the low application group were above the common median. For the accuracy dimension, the median test was not significant ($p > .10$).

Discussion

Before the results are discussed in terms of the specific outcomes of training, it is important to assess the apparent immediate effect of training itself. While this exploratory study was not designed to evaluate directly the effect of training on concept acquisition, it is highly probable that the training procedure was

effective on that criterion; the mean posttraining concept acquisition score was approximately equal to those achieved in past studies designed to assess the effectiveness of the Concepts and Patterns series.

Evidence of longer term conceptual outcomes is suggested in the analysis of trainee responses. Here the indication of some awareness of the concepts during teaching, which is quite subjective, is perhaps less convincing than evidence of the ability to use the concept of probing interpretively. This ability was demonstrated in forty percent of the trainee responses (on the accuracy and application criteria together). Apparently, the concept had at least the characteristics of clarity and stability for these trainees. In general, these results both confirm the considerable previous evidence of conceptual gains through training and suggest that concepts so acquired may be retained by a significant proportion of trainees on something more than a short-term basis following training.

The evidence is inconsistent, however, on the more critical indicator of conceptual effects on skill acquisition: the relationship between measured conceptual outcomes and skill frequencies. A previously established relationship between skill concept acquisition scores and skill frequencies was not confirmed. Thus, in these results, a significant relationship was not established between performance on a concept identification task and skill acquisition. Similarly, the accuracy with which the trainees dealt with the essential

characteristics of the concept of probing in their written responses was found to be unrelated to skill acquisition. The results were different, however, on the most complex conceptual criterion: the trainee's ability to apply the concept of probing by constructing or reconstructing an example of that concept based upon his or her own recorded teaching session. Performance on this variable was positively and significantly related to the frequency of probing.[3]

This inconsistency in results might be attributed partly to the restricted frequency with which the criterial skill was exhibited. A mean skill frequency of 3.1 and a standard deviation of 3.1 are considerably smaller than the mean of 12.3 and standard deviation of 9.1 reported in our previous investigation of concept-skill relationships (Gliessman, Pugh & Bielat, 1979). With such a restricted frequency, only the most complex concept criterion--concept application--may have been sufficiently sensitive to yield significant relationships. Since the posttraining mean score on concept acquisition indicated that training was effective conceptually, this restricted frequency probably is not due to the absence of a training effect. It might well be attributable to limitations imposed on the microteaching session itself

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[3]One might construe this positive relationship to be an artifact since a greater frequency of probes in the recorded teaching session would seem to present a greater opportunity to identify examples. However, when the trainees were asked to assess the frequency of probes in their own teaching sessions, the mean number of probes identified by those high and low on exemplification were approximately the same. Thus, perceptually at least, each group had about the same opportunity to develop examples of the concept. That they differed significantly on this variable suggests that the high application group had better "command" of the essential characteristics of the concept and thus could better develop examples.

(most notably, more stringent time limitations than in the previous investigation).

A nominal outcome of training was reflected in the responses of those trainees who referred to the familiarity of the skills, labeled (as they saw it) with new concept names. In their responses, many of the trainees spoke of using a skill or skills that were already a part of their teaching in the elementary or secondary classroom. Being well established, they were quite readily applied in the microteaching setting.[4]

In view of the expected conceptual outcomes that were evident and the nominal outcomes that were found, the absence of any perceived observational effects in the trainees' responses is rather striking. On the face of it, it would appear that observational effects are simply unimportant to the acquisition of probing as a skill. This interpretation must be qualified, however, in view of the nature of observational learning and the form of the questions that were posed to the trainees. Observational learning tends to be an unverbalized process that may not be very relevant to the acquisition of a verbal skill. Alternately, our questions to the trainees may not have been sufficiently sensitive to elicit the reconstruction of an unverbalized process. The first of these possibilities suggests that different training outcomes may be important in the acquisition of essentially

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[4]Whether these respondents were accurate in identifying their use of probing cannot be directly demonstrated. Some indirect evidence that they may have tended to be accurate is suggested by a statistical comparison of the trainees who were high and low on the dimension of expressed familiarity in terms of skill frequencies. The high group showed a tendency toward more frequent use of probing ($p < .20$).

verbal or essentially nonverbal teaching skills. That, however, is a question for future research.

The Concept Acquisition Model

The foregoing evidence leads us to hypothesize that the acquisition of concepts (as opposed to nominal or observational learning) best accounts for the effect of conceptual-observational training on skill acquisition and that a concept acquisition model is the most profitable one to apply to that type of training.

First, the conceptual outcomes of conceptual-observational training have been well established in our own investigations as well as the investigations of others. While the present study did not confirm a previously established positive relationship between concept acquisition scores and skill frequencies, conceptual performance assessed on the most complex criterion--concept application--was positively related to skill frequencies. While nominal outcomes also were evident in our own data and observational effects of training have been reported (Lange, 1971), the weight of the evidence suggests that conceptual outcomes are more substantial and more important in mediating skill acquisition.

Second, concept acquisition is connected by reasonably adequate theory to skill acquisition. As we have indicated previously, it is reasonable to assume that the acquisition of clearly delineated, discriminable, and stable skill concepts will facilitate use of the skills themselves when the teacher recognizes the appropriateness of those skills in a specific teaching situation (Ausubel & Robinson, 1969).

Third, because the immediate outcome of training--concept acquisition--can be measured efficiently and reliably, a concept acquisition model makes possible more direct and assured control over training. With a dependable means of assessing his or her training methodology, the teacher educator can more intelligently and sensitively modify or alter the conditions of training. The effectiveness of a purely observational training model, in contrast, can really be assessed only at the level of skill performance itself.

Finally, a concept acquisition model is sufficiently comprehensive to account for whatever nominal or observational effects may result from training in addition to the primary conceptual outcomes. To clarify this proposition (and to establish a basis for the implications that follow from the use of a concept acquisition model), we would do well to describe our view of the process of acquiring skill concepts through training. In this description, the integration of conceptual, nominal, and observational elements should be evident.

Basic to our view of the concept acquisition process in skill training is the assumption that teaching skills generally comprise elements of more familiar behaviors; thus prospective trainees are highly likely to have already acquired the major behavior components of the skills to be acquired. At the same time, since the terms used to refer to generic teaching skills (e.g., questioning) are common to everyday language, prospective trainees may be expected to already understand some of the critical characteristics of the skill concepts. Thus, the basis for a nominal effect in training is present. In

addition to a confirmation of this prior learning, training provides for a refinement of the skill concept categories to include some behavior elements that would not normally be attached to the concept and to exclude some behavior elements that are conventionally suggested by the concept. What is accomplished through training, then, is a refining of generally familiar concepts that are attached to skills containing recognizable behaviors. In this process, the use of filmed examples is important less for any direct observational effects that may occur but because such examples help to clarify the skill characteristics. It may be, in fact, that examples of the skill concepts to be acquired convey characteristics of skills that are difficult to codify in the form of definitions. In our own studies (Gliessman & Pugh, 1978), a reliable difference was found in mean concept acquisition scores between trainees viewing filmed examples of a set of defined skill concepts and trainees studying concept definitions alone, the first group achieving significantly higher mean scores. Thus, it is quite likely that observational and conceptual processes interact directly with one another in the acquisition of skill concepts.

Accepting for the moment the validity of this description, we offer a few recommendations for effective skill training based upon the concept acquisition model. The most important goal of training should be mastery of the skill concepts themselves at as high a level of comprehension as possible. To achieve this, the skills to be acquired should be carefully and fully defined in terms

of their critical characteristics. The skills themselves should be systematically exemplified through some form of audio or audio-visual media to convey any behavioral characteristics that are not verbalized in the definitions. The skill concepts should be contrasted and compared with concepts of the same name that are generally familiar while attention is called to any behavior components of the skills themselves that are likely to already be part of well-established teaching behaviors.

The concept acquisition model that we have described should be useful in the training of education professionals other than teachers. In educational supervision, school psychology, psychometric testing, some areas of administration, in short in any professional area where skills can be specified, the model may have promise as a training methodology. As an example, one of the authors is currently conducting an empirical study of the use of concept acquisition training in the acquisition of higher level test administration skills in the administration of the WISC-R. Using videotaped exemplification of specified skills, he is gathering data on change in the use of such skills as probing, redirection, and encouragement of effort. At this point, the model that he has employed appears to have had significant influence on the acquisition of higher level test administration skills. In a field where participation and direct experience have historically been the mode of training, the implications of a successful application of the concept acquisition model could be of practical significance as well.

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